

UNIT 7

LINEAR EQUATIONS

Day 1

Solving Linear Equations

A LINEAR EQUATION is an equation in which the highest degree in a simplified form is 1. To solve a linear equation isolate the variable. A linear equation's graph would look like a line - hence the name linear.

## Types of linear equations:

### IDENTITY EQUATION:

Is true for all values of the variable.

$$\text{Ex: } 3x + 2 = 3x + 2$$

$$\underline{5 = 5}$$

$$\underline{2(x-5) = 5x - 10 - 3x}$$

$$2x - 10 = 2x - 10 \quad R$$

$$-10 = -10$$

## CONDITIONAL EQUATION:

Is FALSE for at least one value of the variable.

Ex:  $5x - 1 = 8$

$$a = 3$$

$$2(x-5) = 9$$

## CONTRADICTION EQUATION:

Is FALSE for all values of the variable.

Ex:  $5x - 3 = 5x + 1$   
 $7 \neq 3$

$\Rightarrow 5x - 3 = 5x + 1$   
 $-3 \neq 1$   
 $\emptyset$

Equations that are equivalent have the same solution set:

examples:

$$6x + 2 = 14$$

$$x = 2$$

$$-4x - 9 = -17$$

$$x = 2$$

Therefore:  $6x + 2 = 14$  and  $-4x - 9 = -17$  are "equivalent"

1) Determine if the equations are equivalent

$$3x+1=7$$

$$2(5x-7)=6$$

$$3x=6$$

$$10x-14=6$$

$$x=2$$

$$10x=20$$

$$x=2$$

Equivalent

2) Solve this linear rational equation

Proportion

$$\frac{2}{x+3} = \frac{-5}{2x-1}$$

$$4x - 2 = -5x - 15$$

$$9x = -13$$

$$x = \frac{-13}{9}$$

Restrictions:  $x+3 \neq 0$        $2x-1 \neq 0$   
 $x \neq -3$        $2x \neq 1$   
 $x \neq \frac{1}{2}$

$$3) \quad 3(x-1) \left( \frac{3x-1}{3} - \frac{2x}{x-1} = x \right)$$

Restrictions:  $x \neq 1$

$$(x-1)(3x-1) - 2x(3) = 3x(x-1)$$

$$3x^2 - 4x + 1 - 6x = 3x^2 - 3x$$

$$\cancel{3x^2} - 10x + 1 = \cancel{3x^2} - 3x$$

$$1 = 7x$$

$$LCD = 3(x-1) \quad \frac{1}{7} = x$$

$$\left\{ \frac{1}{7} \right\}$$

$$4) \quad (.3x - .7 = 3 + .2x) \cdot 10$$

$$3x - 7 = 30 + 2x$$

$$x = 37$$

$$5) \quad x(1 + 2x) = (2x - 1)(x - 2)$$

$$x + \cancel{2x^2} = \cancel{2x^2} - 5x + 2$$

$$6x = 2$$

$$x = \frac{1}{3}$$

HOMEWORK:

WORKSHEET 1: 2 - 50 (even) SKIP 18!